

اقتصاد هندسي - امكان اول - دكتور سامر البنا

السلطة الوطنية الفلسطينية

التخصص والمستوى :

اقتصاد هندسي

اسم المساق :

2012/11/26

تاريخ الامتحان :

50 دقيقة

زمن الامتحان :



جامعة فلسطين التقنية "خضوري"

امتحانات العام الدراسي 2012/2013

الفصل الدراسي الاول

الشعبة :

الاسم :

Questions

Q1. British Airways estimates that unpainted airplanes use less fuel because of less weight to the extent of \$15,000 per year per plane. How much could the company afford to spend NOW to remove the paint from an airplane if it expects to recover its investment in 6 years at $i = 10\%$.

(4 marks)

Q2. Special insulation roofing material can be installed on parts of a warehouse for \$5,000. If the company expects to recover its investment in 5 years through reduced energy costs, how much is the required annual savings at $i = 10\%$ per year?

(4 marks)

Q3. The management of a sensor producing company is studying producing a new irrigation sensor. If the following estimates are used:

- Cost of development is \$12,000 every year for the first 4 years.
- Profit of \$10,000 is expected at year 5 when the new sensor are first sold
- The profit is expected to increase at constant rate until it reaches \$20,000 at year 10.
- The product will be discontinued afterwards due to expected emergence of new technologies.
- The company expected a rate of return of 12%

$\frac{20-10}{5}$

As the company engineer, who are required to present the management with:

- A cash flow of the whole project (3 marks)
- The present net value of the project (12 marks)
- A comment about your opinion of the project economically (2 marks)

Good luck

تم الرفع بواسطة
م. محمد أبو عيسى

Engineering Economy

	<i>Find</i>	<i>From</i>	<i>Equation</i>	<i>No.</i>
Single Payment	F	P	$F = P(1+i)^n$	2.2
	P	F	$P = F/(1+i)^n$	2.3
Equal-Payment Series	P	A	$P = A \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$	2.6
	A	P	$A = P \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$	2.7
	F	A	$F = A \left[\frac{(1+i)^n - 1}{i} \right]$	2.8
	A	F	$A = F \left[\frac{i}{(1+i)^n - 1} \right]$	2.9
Gradient Series (arithmetic)	P	G	$\frac{G}{i} \left[\frac{(1+i)^n - 1}{i(1+i)^n} - \frac{n}{(1+i)^n} \right]$	2.15
	A	G	$G \left[\frac{1}{i} - \frac{n}{(1+i)^n - 1} \right]$	2.17
	F	G	$G \left[\left(\frac{1}{i} \right) \left(\frac{(1+i)^n - 1}{i} - n \right) \right]$	
Gradient Series (geometric)	P	A_1	$A_1 \left[\frac{1 - \left(\frac{1+g}{1+i} \right)^n}{i - g} \right]$	2.23 $i \neq g$
	P	A_1	$A_1 \left[\frac{n}{1+i} \right]$	2.24 $i = g$
Breakeven	Profit = R-(FC+VC) =(r-v)Q-FC			

$$36047 - 6 \left[\frac{0.12}{0.7623} \right]$$

$$5674.24$$

$$5674.24 \left[\frac{0.76234}{0.21148} \right]$$

$$\frac{2.1058}{0.3727}$$

26/11/2012

Answers

21
25

inf, here

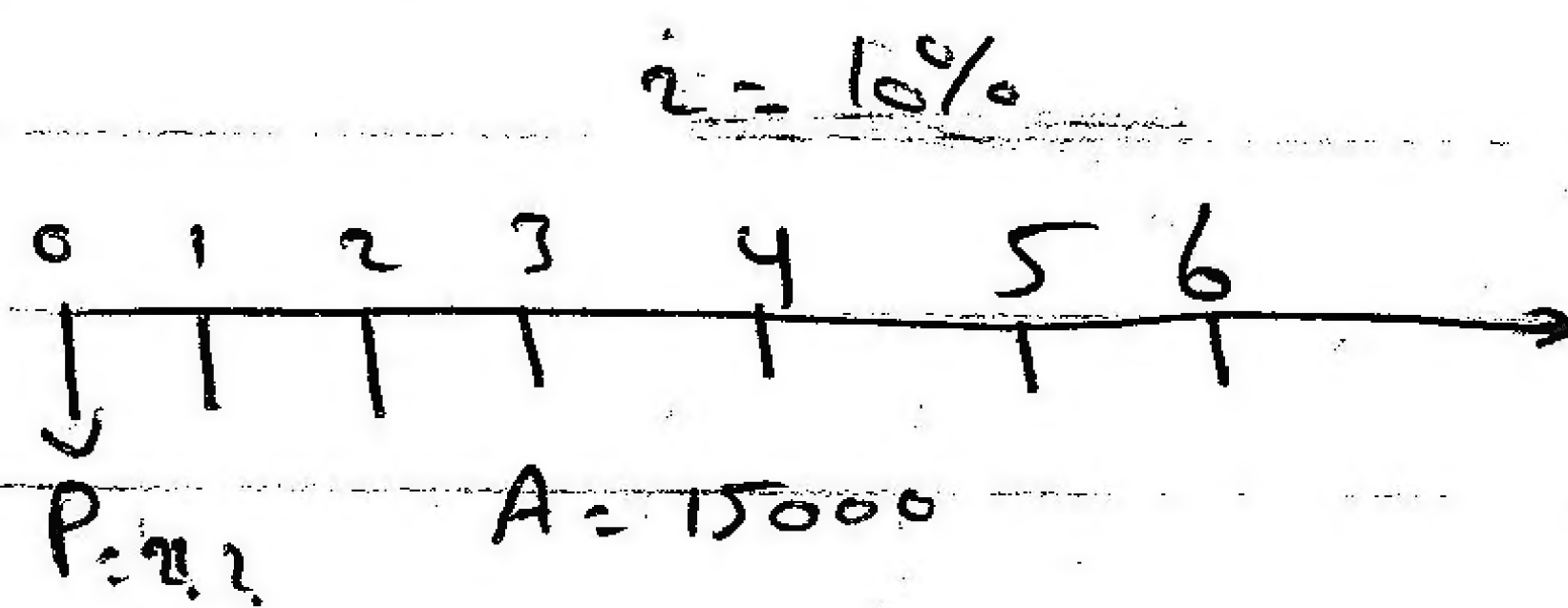
Q1

$$P = A \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$$

$$= 15000 \left[\frac{(1.1)^6 - 1}{0.1(1.1)^6} \right]$$

$$= 15000 \left[\frac{1.771561 - 1}{0.1771561} \right] =$$

$$= 15000 [4.35526] = 65328.91 \$$$

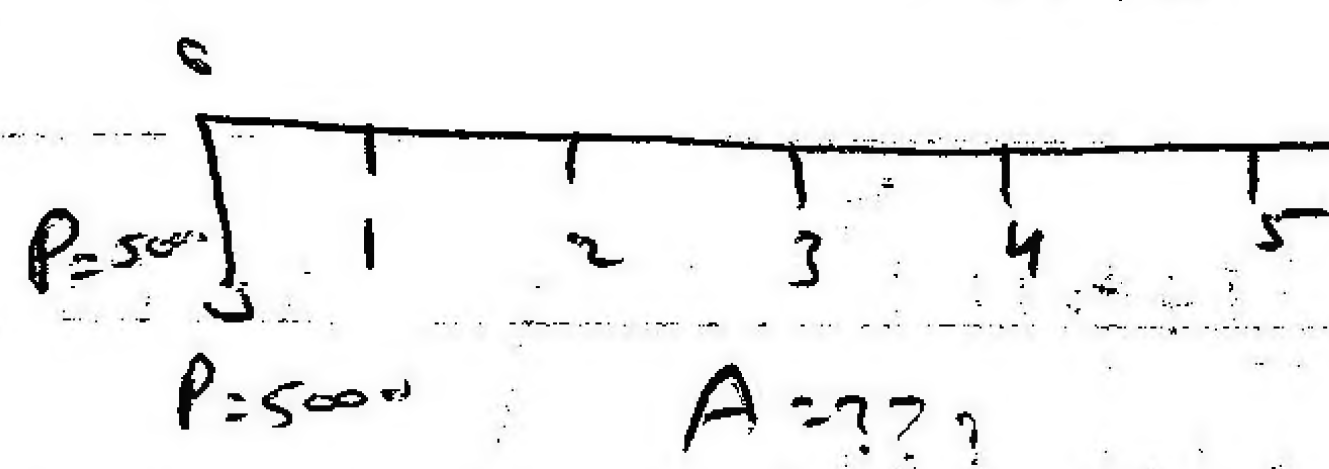


$P_{total} =$
 $15000 + P \text{ for 6 years.}$

4

Now $65328.91 + 15000 = 80328.91$
 $\text{total}(P)$

Q2



$A/P =$

$$A = P \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

$$= 5000 \left[\frac{0.1(1.1)^5}{(1.1)^5 - 1} \right] = 5000 \left[\frac{0.161051}{0.61051} \right]$$

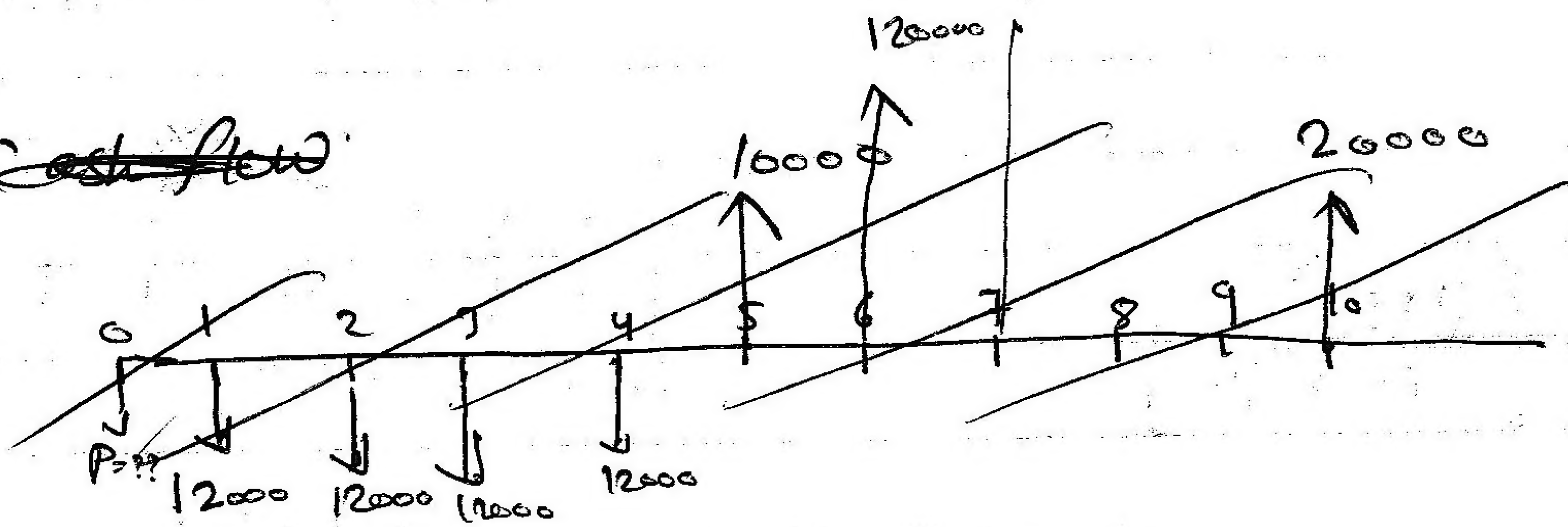
$$= 5000 [0.26379748]$$

$$A = 1318.98 \$$$

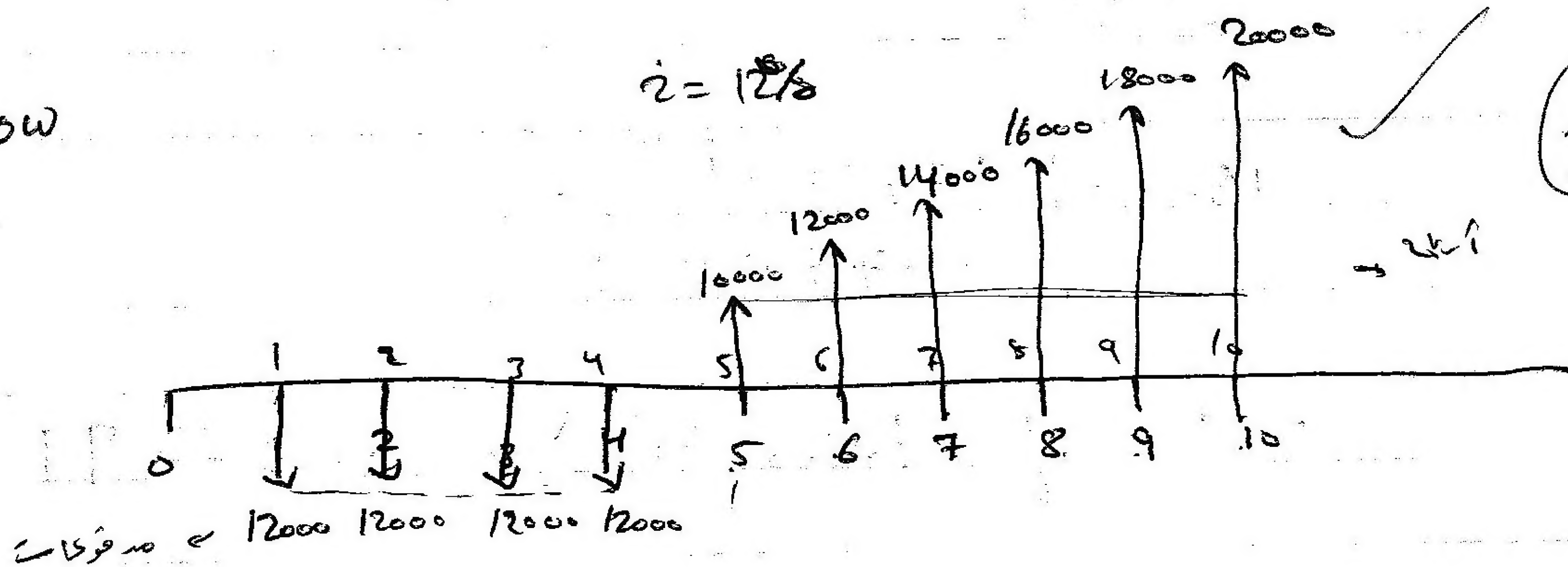
4

Q3

~~Cash flow~~



Cash flow



The present value for the costs =

$$12000 \left[\frac{(1+0.12)^4 - 1}{0.12(1+0.12)^4} \right] = 12000 \left[\frac{0.57352}{0.18882} \right]$$

$$= 12000 [3.0373] = 36448.2$$

The present value for profit

تقريباً القيمة

$$A = 10000$$

$$= 10000 \left[\frac{(1.12)^5 - 1}{0.12(1.12)^5} \right] = 10000 \left[\frac{0.76234}{0.21148} \right]$$

$$= 10000 [3.6047]$$

$$= 36047.6$$

الآن مرجعاً الى سنة صفر وتقريباً القيمة تقبیر
F

$$P_0 = \frac{36047.6}{(1+0.12)^5} = \frac{36047.6}{1.7623} = 20454.37$$

based on mistake
that $n=5$
 n must be 6

$$36047.6 \left[\frac{0.12}{(1.12)^6 - 1} \right]$$

$$P_{\text{total}} = 20454.37 + 36047.6 = 56501.97 \$$$

from gradient $G = 2000$

$$P/G = \frac{2000}{0.12} \left[\frac{(1.12)^6 - 1}{0.12(1.12)^6} - \frac{6}{(1.12)^6} \right]$$

$$16666.67 \left[\frac{0.76234}{0.21148} - 2.8371 \right]$$

8

$$= 16666.67 [0.76768]$$

$$\text{if } \phi \rightarrow \phi_{\text{new}} = 12794.75$$

$$F = 12794.75$$

$$\text{Find } P/F = \frac{12794.75}{1.76234} = 7260.1$$

$$20454.37$$

$$P_{\text{total from } G} = 7260.1 + 12794.75$$

+ A_{10000}

$$= 20054.8$$

$$P_{1000} @ \text{yr } \phi + P_0 @ \text{yr } \phi = 20054.8 + 56501.97$$

$$P = 40108.57$$

$$P_{\text{final}} = 40108.57$$

$$36448.2$$

The Project is good because P of Profit - A
is ~~big~~ ^{big} more than the P of costs

2